more attractive for other operators to establish wireless coverage in the community. The same tower could support one or two PCS operators, a wireless cable or wireless Internet service provider, one or two LMDS service providers and paging/mobile data/vehicle tracking operators. The people living in the community would have more choices, and also can establish more local information/communications based businesses within the community given the availability of modern, reliable communications services.

A third added benefit is to the incumbent telephone company. In addition to its savings and improvements vis-a-vis the wireline operation, the telephone company can offer additional services using the tower, fiber backhaul and switching facilities, or to offer those facilities to one or more third party operators so as to make available additional services. Thus, this wireless solution presents dramatic economies of scope for the incumbent telephone company and the community to enjoy as a result of the shared infrastructure.

The fourth added benefit is to the municipality and regulator, who will be relieved of any ongoing subsidy or consumer complaints that might otherwise result from a lack of choice or inability to develop businesses or services within the community.[16/] Technicians presumably would be easier to attract

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16/ NTIA, in a recent report, similarly concluded that lifestyles in rural ares could significantly benefit from new communications services that now are available in urban areas. Survey of Rural Information Infrastructure Technologies, NTIA Special Publication 95-33, dated September 1995 at p. 5-2:
(continued...)

to the community to handle all the services available on a franchise basis, in addition to satellite TV dishes, in-building wiring and/or modifications, electrical installations and other related work.

C. FWA Will Provide Many Additional Direct and Indirect Benefits

Moreover, to the extent that the Commission adopts the proposed NII/SUPERNet service that will allow schools to develop wireless local area networks connecting the classrooms, the FWA (along with LMDS) service can provide a fast and robust connection from the schools to the telecommunications infrastructure.

16/ (...continued)

> The need for information spans all aspects of rural life, including health care, education, public safety, business and recreation. Section 2 described rural information applications and how telecommunications services are used to support these applications. These applications are expected to improve the quality of life in rural areas. In addition, access to the NII is expected to contribute to the revitalization and diversification of the rural economy.

As illustrated above, FWA service has the ability to provide competition and enhanced communications capabilities for business and public institutional users in rural communities at the same time as improving service to residential users. Thus, FWA service will provide important economic benefits to rural communities, and do so in a manner that equalizes the infrastructure costs rather than subsidizes the individual subscriber line.

Allocation of spectrum for an FWA service will also produce a number of indirect benefits. Such a service will allow more efficient communications, which in turn should increase productivity at U.S. businesses. In addition, because the FWA service will complement the NII/SUPERNet service so as to bring communications capabilities to U.S. schools, the United States will enjoy a better educated workforce, which will also enhance productivity. The improved workplace productivity will allow U.S. companies to compete more effectively in the increasingly global marketplace, which in turn will lead to the creation of additional jobs.

Finally, to the extent that the U.S. allocation for the FWA service is harmonized with the allocations in the rest of the Americas and in Europe, there will be greater export opportunities for American manufacturers. In sum, an FWA service will bring numerous direct and indirect benefits to individuals and businesses throughout the United States.

IV. The Demand for Fixed Wireless Access Service

Nortel believes that there is significant demand for the services that would be made available by an FWA allocation.[17/] As noted above, an FWA service will allow competitive local exchange carriers to deploy networks and begin offering service quickly and relatively inexpensively. Particularly in light of the reforms resulting from the

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17/ See also, DSC Petition at pp. 4-9.

Telecommunications Act of 1996, Nortel expects there to be significant demand from these new service providers for FWA systems.

A. Demand in Rural Areas

Nortel believes that there will be significant demand for FWA service in rural areas. Many of these markets are underserved at present as reflected in the significant number of customers in rural areas still receiving party line service. As also detailed in the recent NTIA study,[18] there is presently a significant unmet need for telecommunications services in rural areas that could be fulfilled by an FWA service. One area of concern expressed in the NTIA Report is the impact of deregulation, because using current technologies, rural areas may not be able to support several competitive service providers.[19] NTIA suggests that multiprovider markets should be developed wherever feasible in both urban and rural areas as a means to reduce costs and spur innovation.[20] As the discussion above in Section III illustrates, FWA service can provide a multi-vendor/multi-service market in a community, particularly once the enabling tower site (and one or more backhaul links) are in

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[18] Survey of Rural Information Infrastructure Technologies, NTIA Special Publication 95-33, dated September 1995.

[19] NTIA Report at p. ix.

[20] NTIA Report at p. ix.

place. Thus, FWA service offers a new paradigm for competitive service provision to medium and low density areas.

Although the Commission created the BETRS service largely to serve the rural market, that solution apparently has proven inadequate. The NTIA Report suggests that BETRS would not serve as a "wireline equivalent" service,[21/] and thus would not meet these rural area demands as well as an FWA service. Indeed, BETRS has not been as widely deployed as anticipated,[22/] and Nortel believes that the limited deployment is due to the service limitations of BETRS technology. The NTIA Report suggests that new wireless technologies are needed to meet the needs of rural areas,[23/] and Nortel contends that FWA service "fits the bill."

21/ NTIA Report at p. 4-44.

22/ NTIA Report at p. 4-46:

> Several other studies concluded that the demand for wireless access in rural areas in the United States would be approximately several hundred thousand lines per year with a total potential market of several million lines. While these studies have shown this kind of demand, actual penetration of BETRS has been significantly less than these studies have indicated. According to Calhoun (1992, p.38), as of the early 1990's, there were more than 50 BETRS systems operating in the United States with several thousand subscribers.

23/ NTIA Report at p. 5-8:

> It is likely that new technology will need to be developed to economically deliver advanced computer networking and video services to individual farms, ranches, and isolated homes. A wireless technology will most likely be required, and certainly the most remote users can only be reached by wireless technology.

B. Demand in Urban Areas

Finally, Nortel believes there is significant demand for FWA services in urban areas, in addition to the expected demand for such systems by the competitive local exchange carriers. Indeed, the fact that FWA service is being deployed in developed (and not just developing) countries is evidence that these systems can economically meet the needs of urban areas. As mentioned previously, the incumbent local exchange carriers will be able to use FWA service to quickly deploy or upgrade service to its customers. The significant number of held orders (many of which are unfilled requests for second lines and ISDN service) and the large number of expected network upgrades could all be supported by an FWA service.

In order that all of these needs of competitive and incumbent local exchange carriers in rural and urban market be fulfilled in a timely manner, Nortel urges the Commission to initiate a rulemaking to allocate spectrum for an FWA service.

V. The Commission Should Allocate 300 MHz of Contiguous Spectrum to the Fixed Wireless Access Service

Nortel has reviewed the expected demand for FWA service in order to determine how much spectrum is needed. Nortel has also undertaken an initial review of the candidate bands in order to determine where such an allocation could be made. Based on that analysis, and considering other important public interest

factors, Nortel recommends that the Commission allocate 300 MHz of contiguous spectrum to the FWA service. Nortel also believes, notwithstanding DSC's assertions to the contrary, that spectrum above 3 GHz should be considered.

Nortel recognizes that it will be necessary to work closely with the incumbent users in whatever band is selected in order to develop a plan for sharing. Nortel commits to undertaking the effort necessary to resolve those issues in a mutually beneficial manner.

A. Bandwidth Necessary to Support an FWA System

Nortel has examined the spectrum needs of the current FWA systems that have been deployed in other countries. Nortel has also evaluated the anticipated spectrum needs for a robust FWA system to meet the requirements for deployment in the United States in low-, medium- and high-density environments. Attachment D provides the detailed calculations of the spectrum needs for FWA under these circumstances. As demonstrated therein, Nortel believes that approximately 70-100 MHz is necessary to support an FWA system that would be capable of serving between 200 and 5,000 subscribers per cell.

B. Other Factors Supporting an Allocation of 300 MHz of Contiguous Spectrum

One significant point to note is that unlike mobile systems, it is not necessary to adopt standardized air interfaces

for FWA technologies. In fact, the ability to optimize and evolve the air interface within each vendor's implementation gives greater freedom to optimize costs and performance for different types of service, and to take advantage of technology enhancements over time. Operators can select different vendors or systems at different times and in different local geographic situations, as they currently do with switching, transport and digital loop carrier systems today. The challenge is to define a spectrum allocation and banding scheme which grants the necessary flexibility while remaining technology neutral, and requires minimal coordination/interference management by the regulator. Nortel believes that allocation of 300 MHz of contiguous spectrum would provide the requisite flexibility.

An additional factor to consider is the policy objective of competition. In order for intraservice competition to develop, it would be necessary to authorize between two and four system operators in a given area or region. These multiple operators would also require flexibility and neutrality in terms of the technologies to be used and the mixture and quality of services to be supported. In determining how much spectrum to allocate, the Commission should also consider the efficient use/re-use of spectrum, the minimization of unusable guard bands and the characterization of potential interference or coordination rules between shared or adjacent users of the allocated spectrum. Taking into account all of these factors, Nortel believes that an allocation of 300 MHz of contiguous spectrum would be appropriate.

C. Potential Bands

The next issue is what bands would be compatible with such an allocation. Nortel believes that there may be some bands that would be well suited for the proposed FWA service. During its market investigations for the United States, Nortel has analyzed the various spectrum possibilities against the commercial, technical and regulatory requirements discussed above. Attachment A discusses the various possibilities, including allocations above 3 GHz.

One alternative being considered as a suggested allocation in the Americas by CITEL is the 3.4-3.7 GHz band.[24/] This band would contain sufficient bandwidth and exhibit the requisite propagation characteristics. Such an allocation does have the added advantage of harmonizing spectrum allocations in the United States with allocations in Europe and the rest of the Americas.[25/]

Nortel has been working closely with regulators in Mexico, Canada, South America and Australia to develop a broad and flexible FWA allocation scheme that would be well suited to

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[24/] Nortel acknowledges that this band is currently being used by the government in the United States, and Nortel has been meeting with representatives of those users to determine whether coordination, sharing or some other arrangement could be worked out.

[25/] The DSC petition references the fact that the spectrum which they are seeking is consistent with the ETSI standards adopted in Europe (for CDMA FWA systems). Nortel observes that ETSI has also standardized the 3400-3600 MHz band for TDMA systems using a channelization scheme compatible with Nortel's current product.

high density deployments and highly competitive environments. At the last two CITEL PCC-III plenary sessions, Nortel submitted information and proposals based on these deliberations, plus its discussions with U.S. administrators. CITEL has accepted a proposal drafted by the representatives of Guatemala and Canada, which Nortel expects will be ratified at CITEL's next Plenary in Brasilia on August 12, 1996.[26/] Nortel has worked closely with the other CITEL participants in the United States (including the FCC, NTIA, State Department, Motorola, Lucent and others) to finalize the details of the proposal for the August ratification in Brazil.

In addition to fixed options in the cellular and PCS bands at 800/1800/1900 MHz, the CITEL proposal identifies a 300 MHz contiguous band at 3400-3700 MHz, organized as six 50 MHz sub-bands. This proposal could support various combinations of reconfigured Nortel, DSC and Lucent systems, for example, and is believed to be flexible enough to accommodate additional vendors' technologies as they emerge. Conversely, the CITEL proposal suggests that the 2 GHz band has been identified for multiple other applications and thus should be avoided for FWA harmonization, thus seemingly conflicting with DSC advocacy of an FWA allocation in the 2 GHz band.

For all of the reasons set forth above, Nortel urges the Commission to propose allocating 300 MHz of contiguous

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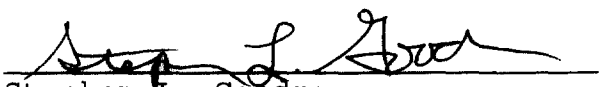
[26/] A copy of the CITEL proposal is appended hereto as Attachment C.

spectrum for the FWA service, and to consider for such an allocation the 3.4-3.7 GHz band that has been proposed by CITEL.

VI. Conclusion

As detailed in these comments, Nortel generally supports DSC's petition to allocate spectrum for "wireline equivalent" FWA service. There is an unmet demand for new and improved telecommunications services that an FWA service is uniquely capable of fulfilling. Nortel disagrees, however, with some of the specific details in DSC's petition. As explained above, Nortel believes that the public interest would best be served by an allocation of 300 MHz of contiguous spectrum to the FWA service, and that an allocation above 3 GHz would be practical. Such an allocation will foster competition and allow for the deployment of robust FWA systems, and also harmonize allocations with the rest of the Americas and Europe. Nortel therefore urges the Commission to move to the notice of proposed rulemaking stage, so that the manifold benefits of FWA can be fully enjoyed.

Respectfully Submitted,



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Dated: August 12, 1996

ATTACHMENT A
Review of Candidate Bands

UHF TV Band (470-806 MHz)

This is generally more valuable for TV Broadcast directly into homes and offices, or for long range and mobile data/paging/tracking type services. However, we have identified the issue of how to get wireline equivalent FWA into individual apartments or offices (see pp. 11-14 in the text), and solutions at these frequencies would be advantageous. Nortel will revisit this market sector as a separate issue, noting that the CMRS Order allows fixed service in the Cellular bands at 800 MHz. Some further allocation for these purposes might be worthy of FCC consideration within the analysis of uses for the UHF TV bands.

PCS Bands (1850-1895/1930-1975 MHz)

These bands have been optimized for mobility (although the CMRS order allows fixed use also). The technologies currently being deployed within these bands do not meet the full "wireline equivalence" criteria discussed in the text, and the 2 x 15/10/5 MHz band structures do not meet the FWA bandwidth requirements discussed in the text. The value placed on these bands at auction for mobility purposes is non-competitive for fixed applications where the value limits are already defined by cable-based solutions.

MDS/MMDS/ITFS/POFS BANDS (2150-2680 MHz)

In theory, there is potential capacity or interest here, but the channels are already committed to numerous uses, although the recent MMDS licensees are known to be experimenting with some FWA-like Internet Access/ISDN delivery technologies. Nortel has identified mutual commercial interest between "wireless cable" and FWA to deliver a combination of TV/Internet and telephony, and we will be investigating this possibility further.

DSC PROPOSALS (1.5 - 2.7 GHz, various)

Nortel has not examined in detail the potential sharing/interference issues within the various bands identified by DSC. We note, however, that the bandwidths are often limited to less than the current DSC product, whereas our market analysis suggests that even wider bandwidths would be required. Although Nortel could technically reconfigure its products to operate within any of the bands proposed by DSC, the limited spectrum in the different bands suggested by DSC would not facilitate multiple operators and vendors within the same area. Although

these bands are almost consistent with the ETSI (CDMA) approvals, they appear to contradict FPLMTS allocations, and do not conform with the CITEL position.

CITEL PROPOSAL (3.4 - 3.7 GHz)

This appears to be the most feasible, subject to agreements with the current government users in the United States, and an appropriate long-term transition plan across the band. This band would also be consistent with ETSI and CITEL positions. Nortel specifically disagrees with DSC's assertion that frequencies above 3 GHz are not suitable for FWA. Nortel agrees that it is somewhat more difficult to operate above 3 GHz, but both Nortel and Lucent have implemented systems at these frequencies, and we can certainly attest that Nortel's systems are operating successfully and reliably in a number of operators' networks and trials as mentioned previously.

GWCS PROPOSAL (4.66 - 4.685 GHz)

This has been proposed by the Commission for general fixed and mobile services, and is being considered for public safety. Spectrum is to be auctioned in five 5 MHz blocks. This would not meet the capacity and range requirements identified previously, and Nortel considers this to be a non-viable option.

HIGHER FREQUENCIES

Nortel is also active in various technologies for the 10.5 GHz, 28 GHz (including LMDS) and 38 GHz bands. Nortel views these as different market sectors, and further believes that these frequencies are not suitable for wide area residential and rural applications.

ATTACHMENT B

SERVICE COMPARISONS BETWEEN FWA AND Non-FWA SOLUTIONS

Characteristic	FWA Solutions	Non-FWA Wireless Solutions
Voice Quality & Transparency	Equivalent to a 300-3400 Hz audio circuit or 64kb/s PCM channel. Subjective Rating (MOS)=4.3 using 64 kb/s PCM or MOS=4.0 using 32 kb/s ADPCM. This quality level is maintained in the face of "normal" link errors or bursts, especially since FWA links are engineered for better Bit Error Rates (see below). Voice recognition systems are optimized for use with standard PCM or analog line quality.	Mobile/Cellular and satellite systems currently have lower voice quality (MOS=3.0 - 4.1). An MOS of 4.0 is probably a reasonable new standard for voice quality, but this is not normally maintained in the presence of errors or error bursts which appear on the transmission link. Voice recognition systems become less reliable or non-functional when voice is compressed/re-constituted via more complex vocoder algorithms.
Call Progress Tone and announcement/ voice answer transparency	Many fax, modem and auto-dialer/re-dialer machines (or PC and telemarketing software application packages) rely on detecting dial-tone, second/third dialtone, network busy and called subscriber ringing/busy tones as part of their normal operation. FWA solutions are transparent to these aspects of fixed network operation	Mobile/Cellular and satellite systems do not provide transparency to call progress tones/announcements - or not in real-time. Many emulations/ simulations are used to mask this difference, but equivalent transparency cannot be guaranteed.
DTMF Transparency	Rotary pulses and/or DTMF signals are sent transparently to the switch for circuit/call setup under user control (including pauses for second dial-tones etc). Once a call is answered, there is complete both way transparency for the exchange of DTMF or other in-band tones used with end-to-end applications (e.g voice mail, banking, medical, etc)	Mobile/Cellular and satellite terminals do not always use DTMF for circuit/call setup, and must take special measures to provide DTMF or in-band tone transparency for end-to-end applications. Sometimes, the delays or echo cancellation techniques within these technologies interfere with the end-to-end applications.

Fax Transparency	Once a call is answered, there is complete both way transparency for the exchange of Fax modem tones, up to the speeds achievable over 300-3400 Hz audio circuit or 64kb/s PCM channels (currently 14.4 kb/s but increasing to 33.6 kb/s)	Mobile/Cellular and satellite systems must often take special measures to provide fax modem tone transparency and even so are often limited to lower speeds.
Modem Transparency	Once a call is answered, there is complete both way transparency for the exchange of data modem tones, up to the speeds achievable over 300-3400 Hz audio circuit or 64kb/s PCM channels (currently 33.6 kb/s but increasing)	Mobile/Cellular and satellite systems must often take special measures to provide data modem tone transparency and even so are often limited to lower speeds.
Caller ID (Number and Name options)	Like wireline networks, FWA solutions support standard calling number/name options and Customer Provided Equipment (CPE) in a transparent manner.	Callers name is not (yet) available on some mobile/cellular and satellite systems, and Caller's number does not normally support standard CPE.
Blocking	Like wireline networks, FWA systems are normally engineered to ensure that only one in every thousand call attempts are rejected because of facility or equipment congestion. The network operator is responsible to maintain these levels in the face of changing usage patterns/rates by the connected users.	Mobile/Cellular and satellite systems must often take special measures to provide this low level of blocking probability. Mobile users cannot be predicted so accurately, resulting in a variable blocking level outside the Operator's control.
Availability	Like wireline networks, FWA systems are engineered for 99.99% availability and outages can be subject to Regulatory reporting and oversight.	Mobile/Cellular and satellite systems are not regulated to ensure any specific availability performance. In some administrations the simultaneous presence of unlicensed or frequency hopping/spread spectrum technologies can make slots unavailable at times, regardless of the blocking predictions and calculations

Loss/level, delay, echo and singing margins	Like wireline networks, FWA systems are designed to a complex set of historical standards to ensure predictable/satisfactory performance for connections between any two subscribers in the local, national or international networks. These standards are coordinated nationally and internationally by the relevant industry and governmental agencies. The user holds his local access provider accountable for the satisfactory performance of the overall network.	Mobile/Cellular and satellite systems currently interface to the fixed networks to ensure satisfactory overall performance. New/independent access operators and technologies could use different standards which might not offer the same guarantees or assurances to the end user.
Customer Interfaces	Like wireline networks, FWA systems are standardized around the RJ-11, ISDN and E1/T1 specifications (or national equivalents), to ensure that customer owned telephones and other apparatus can interoperate with the networks in a safe and consistent manner.	Mobile/Cellular and satellite systems provide standardized Air Interfaces or proprietary hardware/software terminals, and must adapt these to provide the standard RJ-11, ISDN or data interfaces when applicable.
Power Supply	Like wireline networks, FWA systems provide engineered battery backup capabilities, which can be supplemented with local power sources to ensure prolonged backup in extreme cases. Battery condition and local mains failure can be monitored centrally, and battery replacement/ disposal/recycling operations can be managed efficiently under controlled standards.	Mobile/Cellular and satellite systems (plus the newer Fiber and Cable TV systems) often depend on local AC power sources, with local battery backup to cover AC failures for a limited period. Users must take responsibility for ensuring that terminal batteries remain fully charged in case of an emergency and are exchanged/disposed of properly when their life expires.

ATTACHMENT C

The following DECISION of the CITEL Permanent Consultative Committee (PCC) III (Radiocommunications) is extracted from the Final Report of the Fourth Meeting held in Asuncion, Paraguay from 18th - 22nd March 1996.

The meetings were held under the Chairmanship of Sr. Luis Manuel Brown Hernandez (Head of the Mexican delegation). The Vice-chairman was Sr. Joao Carlos Fagundes Albernaz (Head of the Brazilian delegation) who was also the Chairman of the PCS Working Group under which this particular Decision and draft Recommendations were formulated.

Participants at the Fourth Meeting included Official Delegations from Argentina, Brazil, Canada, Colombia, Ecuador, United States, Guatemala, Mexico, Paraguay, Peru, Suriname, Uruguay and Venezuela plus Associate members from AT&T (US), CANTV (Venezuela), Comsat (US), Ericsson (Argentina, Brazil, Colombia, Chile, Mexico and Venezuela), Leo One Panamericana (Mexico), Motorola (Brazil,US), Nortel (Canada, US), Silveira Corp (Argentina) and Telefonica (Argentina).

The Extracted Official Text Follows

DECISION PCC-III/ DEC.7 (IV-96)

The Fourth Meeting of Permanent Consultative Committee III decided to instruct the Executive Secretary to distribute Document PCC.III-296/96 "Land Mobile Handbook (including Wireless Access)" plus the Draft Recommendations in Annexes I and II to

all members of the PCC.III, requesting that they send their comments to the Chairman of the PCS Working Group regarding the text of the draft Recommendations, and be prepared at the August meeting of PCC.III to accept these Recommendations or propose amendments, or propose additional bands for harmonized Fixed Wireless Access (FWA).

Annex I

DRAFT RECOMMENDATION PCC-III/REC.

IDENTIFICATION OF SPECTRUM FOR FIXED WIRELESS ACCESS SYSTEMS IN THE AMERICAS

The Fourth Meeting of the Permanent Consultative Committee III: Radiocommunications,

CONSIDERING:

a) That Recommendation PCC.III/REC.10(III-95) on the identification of spectrum for Fixed Wireless Access (FWA) requested contributions on this topic.

b) That Document PCC.III-295/96, an input contribution that was received and discussed at the Fourth Meeting of PCC.III, proposed a draft Recommendation on Fixed Wireless Access in the Americas operating in the 3.4 - 3.7 GHz Band.

c) That the Fourth Meeting of PCC.III identified the following issues on FWA:

- the need to have multiple frequency bands harmonized for FWA;
- the need for each country to understand its FWA requirements in order to provide service in that country;
- the need to consider the applicability of systems based on standardized radio interfaces and other systems based on proprietary radio interface technologies;
- the desirability of countries of the region to adopt solutions that favor economies of scale.

d) That the ITU-R is developing a "Land Mobile Handbook (including Wireless Access)" addressing FWA issues and providing technical and economic considerations on FWA, and that a draft version is available (Document PCC.III-296/96).

e) That the cellular services operate in the 825-894 MHz band in most CITEL member countries.

f) That the PCS operating band (1850 - 1990 MHz) for the Americas has been designated in PCC.III/REC.12(III-95) and that PCC.III/REC.11(III-95) identifies the PCS sub-bands A-F.

g) That the 2 - 3 GHz band has been identified for multiple other applications and thus should be avoided for FWA harmonization.

RECOMMENDS:

1) That the 824-849/869-894 MHz cellular band and the 1850 - 1990 MHz PCS band be identified on a co-primary basis for FWA and mobile.

2) That for countries which choose to implement FWA in the 1850-1990 MHz PCS band it may be desirable to dedicate a sub-band of the 1850 - 1990 MHz PCS band exclusively for FWA, for example the sub-bands E (1885 - 1890/1965 - 1970 MHz) and F (1890 - 1895/1970 - 1975 MHz).

3) That for those countries which choose to implement FWA in all or part of the 3.4 - 3.7 GHz band do so in accordance with the 50 MHz sub-band structure as described in proposed draft Recommendation "Fixed Wireless Access in the Americas Operating in the 3.4 - 3.7 GHz Band".

Annex II

DRAFT RECOMMENDATION PCC-III/REC.

FIXED WIRELESS ACCESS IN THE AMERICAS OPERATING IN THE 3.4 - 3.7 GHz BAND

The Fourth Meeting of the Permanent Consultative Committee III: Radiocommunications,

CONSIDERING:

a) That wireless technologies represent an opportunity for a major improvement in Fixed Wireless Access (FWA) voice and data services for individuals or businesses which would be integrated into a variety of competing access networks;

b) That fixed wireless access is an important application of radio technologies, with significant advantages in many cases over wireline access alternatives;

c) That to facilitate the deployment of fixed wireless access systems it is desirable that suitable radio spectrum bands be identified for this application;

d) That various technologies for fixed wireless access are being introduced in the marketplace in the frequency range 3.4-3.7 GHz;

e) That several countries in the continent are already using spectrum in 3.4-3.7 GHz for FWA;

f) That the 3.4-3.7 GHz band may be divided into sub-bands suitable for FWA system implementations as described in Annex A.

RECOMMENDS:

1) That countries in the Americas consider the radio frequency band in 3.4-3.7 GHz for the implementation of fixed wireless access systems; subject to spectrum availability.

2) That 6 contiguous 50 MHz sub-bands should be designated for FWA applications in the band 3400 to 3700 MHz.

Annex A
A Suitable Band Plan for FWA

The 3.4 to 3.7 GHz band may be divided into sub-bands of 50 MHz. Each of the contiguous 50 MHz sub-bands are to be provided with 4 MHz guard bands at each end, see Figure 1.

Figure 1. Frequency Band Plan

It should be noted that some technologies may require, in addition to the guard bands shown in Figure 1, additional adjacent channel protection. This frequency band plan provides suitable flexibility, for example:

1. Operators can use one or more sub-bands A-F to suit their specific vendor and modulation scheme or capacity/service requirements.

2. Each operator can use different technologies in different sub-bands or different geographic areas, to meet local requirements.

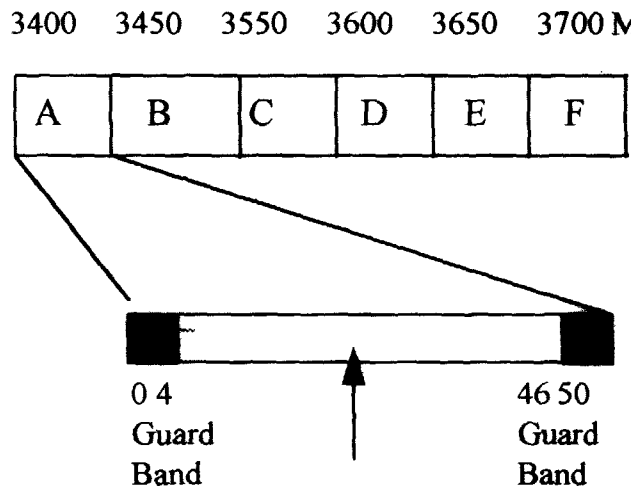
3. Operators can use these sub-bands on a local, regional or national basis, and can use a variety of vendors and technologies to suit each area or service mix and technology/evolution option.

4. Operators can share their sub-band(s) under bilateral co-ordination and sharing agreements which can vary in each area.

5. Choice of 50 MHz sub-band(s) or combinations (on a national, regional or local basis) can be influenced by the presence of other Radiocommunications applications (e.g., radio location, fixed satellite, and conventional point-to-point fixed systems).

Technology flexibility is achieved by not defining the channelization within each sub-band. This will enable operators to choose TDMA, CDMA, TDD, FDD or appropriate mixtures, and vary their choices by geographic area over time as the technologies evolve. The operator's objective is to deliver a range of services via standardized fixed interfaces (RJ-11, ISDN, RS-232/422) regardless of the bearer technology, rather than to meet a standard air interface or wireless terminal specification.

Competitive offerings are achieved by the need to co-ordinate the use of the sub-bands in the most valuable way for the mix of services and technologies needed by the operator. This can change over time and over different geographic areas. Examples of possible sub-band combinations include:



Specific Channelization & Sharring Schemes

Nortel Proximity 1	:A+B, B+C, C+D, D+E or E+F
DSCAirspan	:A+D, B+E Oor C+F
AT&T Airloop	:A&B + E&F
TDD Vendor	:Any sub-band or contiguous group of sub-bands

Notes

1. Operators can license one or more sub-bands A-F to suit their specific vendor and modulation scheme or capacity/service requirements.
2. Each Operator can use a different solution in different sub-bands or different geographic areas
3. Operators can be licensed on a local, regional or national basis, but can use a variety of vendors and technologies to suit each area or service mix and technology/evolution option.
4. Operators can share their sub-band(s) under bilateral coordination and sharing agreements which can vary in each area or cell.
5. Choice of 50 MHz Sub-band(s) or combinations (on a national, regional or local basis) can be influenced by the presence of local interferers (*e.g.*, military, fixed microwave or C-Band satellite transmissions.
6. Spread Spectrum or frequency hopping transmissions can be overlaid across the 300 MHz band, subject to agreed maximum power and interference criteria to/from the 50 MHz sub-bands.

Attachment D
Spectrum Requirements for an FWA System

The simultaneous call capacity of each base station varies from around 20 in some low-density systems designed for rural communities to more than 500 for higher density FWA systems. Thus, each cell will support between 200 and 5,000 subscriber lines at full wireline quality and reliability, with suitable allowance for various calling rates and service mixtures (e.g., fax/modem/data/ISDN/fractional T1).

Depending on the technology employed (e.g, TDMA or different versions of CDMA), each RF bearer needs to be somewhere between 307 kHz (under Nortel's currently offered systems), 3.5 MHz (under DSC's currently offered systems) and 10 MHz (under Lucent's currently offered systems) for each of the uplinks and downlinks, supporting 10, 30 and 28 simultaneous traffic channels per bearer, respectively. To meet the maximum traffic loads and line counts mentioned above, the number of RF bearers per base station varies between 12 (DSC), 36 (Nortel) and 10 (Lucent) in order to support a 32/64 kb/s voice/fax/data capability, with a 1% blocking grade of service for 2-3 ccs per line (calculated on an Average Busy Hour basis).

Also factored into the spectrum requirements are the geographic coverage and frequency reuse capabilities of the FWA systems. For rural areas, the cell radius is required to reach up to 10-15 miles in most cases (with the need to reach up to 25 miles in some exceptional cases). For wide area coverage, a frequency re-use factor should be employed, with the particular